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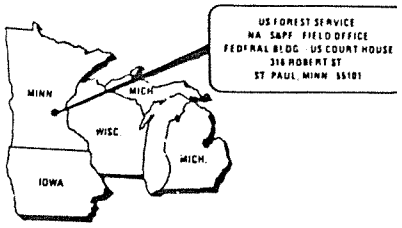

BIOLOGY OF RED-HUMPED OAKWORM

by Imants Millers and Thomas Eiber

The red-humped oakworm, Symmerista canicosta Franc. (formerly albifrons, or albicosta) is a native insect of northern oak forests. Historically, it has appeared in outbreak numbers at 10-15 year intervals, and the epidemics have collapsed in 1-3 years. Usually, the red-humped oakworm appears in association with several other defoliators. Occasionally, nearly pure red-humped oakworm populations occur. The current outbreak in Michigan covers over 400 sq. mi., and smaller infestations are present in Iowa, Minnesota and Wisconsin. The following report is based mainly on observations made during the oakworm studies by the authors.

HOSTS

The caterpillars feed only on oak leaves. When the stands are defoliated, some damage may be found on maple and other trees. The latter feeding is more likely the result of oakworm associates that have a more varied feeding habit.

INJURY

Trees of all sizes are susceptible to attack. However, oakworm outbreaks seem to appear first in predominantly oak areas with trees more than 30 years old. The early larval feeding causes the tip of leaf to turn to a tan brown color wherever a colony is present. Later, larval feeding results in skeletonized leaves. When caterpillars are abundant, all the oak leaves may be consumed by mid-August. However, defoliated stands may appear until late September.

The oaks tend to put out a light set of new leaves after early defoliation. We suspect that this weakens the trees and some twig mortality may result. Past outbreaks have not caused tree mortality. However, an unusual combination of events, such as late spring frost caused defoliation, followed by some other insect defoliation, with a dry summer and ending into oakworm defoliation, might cause tree mortality.

The greatest impact of red-humped oakworm occurs in high use forest areas, such as campgrounds, residences and along travel routes. The insect frass (cellulose remains excreted by the caterpillars) falling from the trees contaminates food and dirties camping equipment. It can be carried into the house, or become slippery after a soaking rain. The caterpillars themselves fall to the ground and cause similar problems. When most of the leaves are consumed the larvae wander on to buildings where they may cause staining of paint. Large numbers of caterpillars on trees, posts or roads upset many people. The dying caterpillars cause an obnoxious odor.

DESCRIPTION

The eggs are deposited in clusters of about 50 on the underside of the oak leaves. The egg-mass is about 1/4" in diameter, single layered with the eggs frequently arranged in rows. Each egg is the size of a pinhead and is pale white at first, but darkens with age. Shortly before hatching, the dark head of the caterpillar is visible in the egg. The empty mass of silvery egg shells remain on the oak leaf for several weeks.

The small caterpillar is about 1/8 inch long, light green with a black head. The second and third instar larva is more yellowish green, has a black stripe down its back, and the head varies from light to dark orange. An orange hump on the hind end of the body becomes noticeable. The fourth instar larva becomes more colorful with black, orange and yellow markings. The back stripe now appears as 3 black lines. At this stage it may be confused with the 3-striped orange-humped maplewood. Besides the orange head, the hind hump is also now bright orange. The fifth and sixth instar larvae are nearly 2 inches long with 5 black stripes down their backs. The head and the hump are bright orange.

Shortly before pupation the larvae become quiet, and become more bulging in the middle. They molt into a chestnut brown, shiny pupa about 1/2-3/4 inches long. The head end is rounded, but the hind end sharply pointed. The moth is ashen gray, mottled with white, with a whitish forewing margin. The wing expanse is 1-1/2 inches across, and the moth is about 1-1/4 inches long when the wings are folded at rest. On the tree, the moth with its wings closely appressed to the body, appears as a broken stub on the trunk.

LIFE HISTORY AND HABITS

The oakworm has one generation a year. The insect overwinters as pupa in the ground litter webbed between leaves or broken litter. Sometimes pupae are found exposed in the duff. The moths emerge from early June to mid-August. A female lays about 10 egg-masses on the underside of oak leaves and dies in about 2 weeks. However, some pupae remain in the ground for the second winter.

The eggs hatch in about 10 days and the small caterpillars begin to feed in a colony on the upper surface tissues of the leaf. The larvae rest on the underside. When disturbed the caterpillars spin down on silken threads. Then, as the wind twirls the larvae around most of the threads become intertwined and the larvae return to the leaf. For about a month the caterpillars feed in colonies of 10-200 insects, and mixing of colonies is common. As the larvae grow they eat the whole leaf. The colonies remain until about the 5th instar, but mixing of larvae between colonies occurs from the beginning. Larvae in the last 3 instars are voracious feeders, consuming almost 10 leaves each. Most of the tree defoliation is caused by the older larvae.

The larvae have matured by the end of September, and enter the litter to pupate. Few late season larvae may feed into October and overwinter as mature larvae.

ASSOCIATED CATERPILLARS

The red-humped oakworms may occur in nearly pure populations, or in association with several other relatives from the family Notodontidae. The mapleworm, Symmerista leucitys Franc., is a caterpillar, nearly identical to the oakworm except for 3 black stripes instead of 5 when full grown. It prefers basswood, elm and maple, but may feed on oak. The variable oak leaf caterpillar, Heterocampa manteo (Dbldy.), has purple markings on its back and black stripe on each side of the head. It feeds on oak and a host of other hardwoods. The orange-striped oakworm, Anisota senatoria (J.E. Smith) is large black caterpillar with orange stripes on its sides. A black soft horn is on its back near the head. This Anisota feeds on a variety of hardwoods. A number of Datana caterpillars, usually black with white or yellow stripes and light scattering of hairs are found in association with the oakworm.

NATURAL CONTROL

A host of parasitoids attack the oakworm during its various life stages. Several egg wasps have been collected, but their identity is not clear. Several stink bugs (Pentatomidae) attack the eggs and larvae. A large, green beetle, Calosoma spp., feeds on the larvae and pupae. Mice and parasitic wasps destroy pupae. All of these biological agents may be important control factors when the oakworm numbers are low. However, in outbreak situations their role appears insignificant. Diseases have been reported as cause of outbreak collapse. More recent studies suggest that a stress factor such as adverse weather or starvation is needed before disease becomes effective. Usually, the oakworms become as numerous in second or 3rd year of outbreak that "they ear themselves out of home", i.e. starvation may occur by the 5th instar, and the larvae die before reaching the pupal state. Dead larvae are found in great numbers, with various disease organisms within, and the die-off is mistaken for disease epidemic.

DIRECT CONTROL

Direct control measures are not used in the general forest environment. The outbreaks usually cover thousands of acres, the current one several hundred thousand acres, making large scale operation impractical. Since most of the defoliation occurs late in the tourist season, and most of the defoliated areas are not seen by visitors, the problem narrows down to the high use areas.

The U.S. Forest Service has screened several insecticides. The materials with greatest promise will be field tested in the near future. Federal laws prohibit the use, or even recommending the use, of pesticides that are not registered by the Environmental Protection Agency. Several materials were field tested by the entomologists of the Michigan Agricultural Cooperative Extension Service. For their recommendations the landowners should contact their local County Extension Agents, or Department of Entomology, Michigan State University.

REFERENCES

Baker, W.L. 1972. Eastern Forest Insects vs. Dept. Agric., Forest Service Misc. Publ. No. 1175.

Franclemont, J.G. 1946. A revision of the Species of Symmerista Hubner known to occur north of the Mexican border (Lepidoptera, Notodontidae). Canad. Entomologist 88:96-103.